



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/856,543	12/13/2001	Gerhard Hartwich	PATKRI P01AUS	9206
20210	7590	02/25/2004		
DAVIS & BUJOLD, P.L.L.C. FOURTH FLOOR 500 N. COMMERCIAL STREET MANCHESTER, NH 03101-1151			EXAMINER RILEY, JEZIA	
			ART UNIT 1637	PAPER NUMBER

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

2A.1

Office Action Summary

Application No.

09/856,543

Applicant(s)

HARTWICH ET AL.

Examiner

Jezia Riley

Art Unit

1637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-83 is/are pending in the application.
- 4a) Of the above claim(s) 29-55,61-63,65,67-70 and 72-83 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 56,58-60,64,66 and 71 is/are rejected.
- 7) ☒ Claim(s) 57 is/are objected to.
- 8) ☒ Claim(s) 29-83 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group III. is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim 65 should have been included in group I as it depends from claim 36 and was mistakenly included in group III. Therefore claim 65 has been withdrawn from examination.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 58-60 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 58-60 are vague and indefinite because the word "likewise" renders the claims unclear. It is unclear if it is required that the chemical compounds are attached to the conductive surface in the exact similar way as the attachment of the double-stand hybrid or if that it is only 1% , 20 %... (for example) similar. The attachment of the chemical compounds is therefore unclear because it raises the question as to whatever is exactly the chemistry of the attachment.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 56, 58, 59, 64, 66, 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorp et al. (5,968,745) in view of Cosentino (3,662,745).

Thorp discloses electrodes for detecting nucleic acid hybridization and to the method of detecting nucleic acids utilizing such electrodes. Thorp provides electrodes which can accurately measure the results of the oxidation-reduction reaction, and

Art Unit: 1637

provide other criteria of covalent oligonucleotide attachment, mediator diffusion, electrochemical inertness, and effective hybridization of target oligonucleotides.

The method is directed to a polymer-electrode useful for the electrochemical detection of a preselected base in a nucleic acid, said polymer-electrode comprising: (a) a substrate having a conductive working surface; and (b) a polymer layer on said conductive working surface, said polymer layer having a plurality of microfluidic reaction openings distributed throughout the layer. An oligonucleotide probe is preferably bound to the polymer layer. (Summary of the invention).

The terms "hybridized DNA" and "hybridized nucleic acid" refer to a single-stranded DNA or nucleic acid which is hybridized to form a double-stranded DNA or nucleic acid, or a double-stranded DNA or nucleic acid which is hybridized to form triple helix DNA or nucleic acid. (col.4).

The polymer layer can be brought into contact with the substrate at any point during treatment or reacting of the polymer. The completed polymer-electrode of the invention comprises: (a) a substrate having a conductive working surface; and (b) a polymer layer on said conductive working surface. (col.4).

As is conventional, the electrode used in the invention comprises a substrate with the outer surface functioning as a conductive working surface. The substrate may itself be conductive or it may be nonconductive but have a conductive working surface.(col. 4).

Art Unit: 1637

The polymer layer may be placed in contact with the conductive working surface by any suitable means, such as by clamping the polymer layer to the surface, by vacuum, by a liquid interface, or by evaporation of a porous polymer film on the surface. Sufficient contact is required so that electrons may pass through the polymer layer to the conductive surface. The polymer layer is preferably modified, for example, by oxidation and/or by binding thereto any conventional coupling agent such as a carbodiimide, or to such agents as N-hydroxysuccinimide, glutaraldehyde. (col.6).

The polymer-electrode and methods of utilizing the polymer-electrode enable detection of hybridized nucleic acid. In this method, a nucleic acid sample is contacted with an oligonucleotide probe to form a hybridized nucleic acid. (col.7). After hybridization, the hybridized nucleic acid is reacted with a suitable mediator which is capable of oxidizing a preselected base in an oxidation-reduction reaction. The preselected base can be any naturally occurring or synthetic nucleotide base which undergoes oxidation upon reaction with the selected mediator. The preselected base exhibits a unique oxidation rate when paired as compared to when the preselected base is unpaired. The preselected base should exhibit unique oxidation rates when paired with each of the four naturally occurring bases. The mediator may be any molecule such as a cationic, anionic, non-ionic, or zwitterionic molecule which is reactive with the preselected base at a unique oxidation potential to transfer electrons from the nucleic acid to the electrode. Thus the selection of mediator will be dependent upon the particular preselected base chosen, and will be readily determinable by those skilled in the art. (col.8-9, col.12).

Examples 3 and 4 disclose attachment of the probes to the surface which are viewed to be inclusive of instant claims 64 and 66.

The occurrence of the oxidation-reduction reaction may be detected using a polymer-electrode to observe a change in the electronic signal which is indicative of the occurrence of the oxidation-reduction reaction. Typically, a polymer-electrode which is sensitive to the transfer of electrons between the mediator and the hybridized nucleic acid is placed in contact with the solution containing the reacted hybridized nucleic acid and mediator. Generally, a reference electrode and an auxiliary electrode are also placed in contact with the solution in conjunction with the detection electrode (with most of the current passing through the auxiliary electrode). Similarly, suitable reference electrodes will also be known in the art and include, for example, silver/silver chloride electrodes. Which is viewed to be inclusive of the normal hydrogen electrode of the instant claims and in view of Cosentino.

Cosentino discloses an electrode comprising a mixture of a metal and a metal salt incorporated into a matrix material. This basic electrode material is coatable on an electrically conducting substrate to provide an excellent quality, low cost electrode assembly. The method of making the same comprising forming a mixture of a metal and metal salt incorporating the resultant mixture into a matrix therefor and applying that resulting mixture to the electrically conducting substrate. Electrodes are used whenever it becomes necessary to convert from electronic conduction, conduction in a metal by valence electrons, to conduction in an ionic solution or gel. In ionic conduction charge is

transferred by means of ions of much greater mass than electrons. In chemistry, they may be used to study chemical reactions and to determine the activity (concentration) of various ions. In medicine they are used to monitor the living organisms ion movements, electrocardiogram, electroencephalogram, etc.

There are a number of properties of electrodes common to all these uses which are a measure of how well an electrode functions. The first property is the potential measured between an electrode and another standard electrode, or the potential between two identical electrodes, the latter commonly referred to as "offset potential." In the case of a silver, silver chloride electrode is referred to as the "standard hydrogen electrode".(col.1).

Therefore the electrode of Thorp is viewed to be inclusive of the hydrogen electrode of the instant claims since Cosentino discloses that silver/ silver chloride electrode can be referred as a standard hydrogen electrode.

5. Claim 57 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

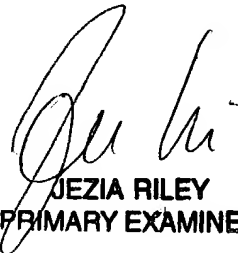
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jezia Riley whose telephone number is 571-272-0786. The examiner can normally be reached on 9:30AM - 5:00PM.

Art Unit: 1637

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Monday, February 23, 2004



JEZIA RILEY
PRIMARY EXAMINER